WHAT IS CLAIMED IS:

Sub A1

1. A method for reprogramming and/or altering the life-span of a desired cell ("recipient cell") comprising introducing into such cell cytoplasm from another less differentiated or undifferentiated cell ("donor cell").

2. The method of Claim 1, wherein said donor cell is an oocyte or an embryonic cell.

3. The method of Claim 1, which further comprises the introduction of telomerase or a DNA construct that provides for the expression of telomerase into said recipient cell.

4. The method of Claim 1, wherein said recipient cell comprises a telomerase DNA under the control of a regulatable promoter.

Sub A2

5. The method of Claim 1, wherein said cell is a mammalian cell.

6. The method of Claim 5, wherein said mammalian cell is derived from a mammal selected from the group consisting of non-human primate, human, rat, guinea pig, mouse, rabbit, dog, cat, hamster, goat, cattle, sheep, horse, bison and buffalo.

7. The method of Claim 5, wherein said mammalian cell is a human somatic cell.

8. The method of Claim 7, wherein said mammalian cell is selected from the group consisting of cardiac, lung, skin, liver, stomach, intestine, neural, muscle, bone, cartilage, immune, pancreatic, spleen, esophageal, and corneal cells.

9. The method of Claim 1, wherein said recipient cells are genetically modified prior, concurrent and/or subsequent to the introduction of said cytoplasm.

10. The method of Claim 9, wherein said genetic modified cells comprise several genetic modifications.

11. The method of Claim 9, wherein said genetically modified recipient cells comprise a recombinant DNA that encodes for a desired polypeptide.

12. The method of Claim 11, wherein said recombinant DNA encodes for a polypeptide selected from the group consisting of a hormone, growth factor, structural polypeptide, enzyme, enzyme agonist or antagonist, antibody, antibacterial, anti-viral, anti-fungal, cytokine, clotting factor, and anti-tumor polypeptide.

13. The method of Claim 1, which results in the increased life-span of a mammalian cell.

14. The method of Claim 1, wherein said donor cell is of a different species than the recipient cell.

15. The method of Claim 14, wherein said donor cell is a non-human primate oocyte or embryonic cell and the recipient cell is a human somatic cell.

16. The method of Claim 1, which results in the production of an embryonic stem cell.

17. An improved method of gene therapy which involves the introduction of at least one genetic modified cell wherein the improvement comprises using as the genetically modified cell, a mammalian cell having an increased life-span and/or which has been "reprogrammed" by the introduction of cytoplasm from an oocyte or embryonic donor cell of the same or different species.

18. The method of Claim 17, wherein said mammalian cell is a human cell and the donor cell is an oocyte of human or non-human origin.

19. The method of Claim 18, wherein the genetically modified cell comprises more than one genetic modification and cytoplasm from a donor oocyte or embryonic cell is introduced into said mammalian cell one or more times during the culturing of said multiply genetically modified cell in order to prevent or inhibit senescence.

20. A biologically pure culture comprising at least one mammalian cell that has been "reprogrammed" and/or had its life-span altered (increased) by the introduction of cytoplasm from an oocyte or embryonic cell of the same or different species.

21. The culture of Claim 20, wherein said mammalian cell is selected from the group consisting of human, non-human primate, mouse, rat, guinea pig, rabbit, hamster, goat, bovine, equine, ovine, canine and feline cells.

22. The culture of Claim 20, wherein said mammalian cell is a human cell.

23. The culture of Claim 20, wherein said mammalian cell comprises one or multiple genetic modifications.

24. An improved method of cloning a non-human mammal via nuclear transfer by the introduction of a donor mammalian cell or nucleus into an enucleated oocyte of the same or different species as the donor cell, fusing said cell or nucleus and said oocyte, and culturing said nuclear fusion to produce an embryo suitable for implantation and implanting said embryo into a suitable female surrogate to produce a cloned offspring, wherein the improvement comprises using as the donor mammalian cell one which has been reprogrammed and/or had its life-span altered by the introduction of cytoplasm from an oocyte or embryonic cell of the same or different species as the donor mammalian cell.

25. The method of Claim 24, wherein said donor mammalian cell has been genetically modified to comprise one or multiple genetic modifications.

26. A method for producing a culture comprising embryonic stem cells comprising introducing into a mammalian cell in tissue culture containing an effective amount of cytoplasm from a donor oocyte or embryonic cell of the same or different species as the mammalian cell.

27. The method of Claim 26, wherein said mammalian cell has been genetically modified prior, subsequent, or concurrent to the introduction of cytoplasm from the donor oocyte or embryonic cell.

28. The method of Claim 26, wherein the mammalian cell is a human or non-human primate cell.

29. The method of Claim 28, wherein said embryonic stem cells are cultured under conditions that allow them to differentiate into different cell types.

30. The method of Claim 26, wherein telomerase or a DNA sequence providing for the expression of telomerase is further introduced into said mammalian cell.

31. The method of Claim 30, wherein the expression of said telomerase DNA sequence is under the control of a regulatable promoter.

32. A biologically pure culture comprising embryonic stem cells produced by the method of Claim 26.

33. A method for identifying nucleic acid sequences that are potentially involved in cell reprogramming comprising the following steps:

(i) contacting nuclei derived from isolated nuclei derived from differentiated cells with cytoplasm or cytoplasm fractions derived from an oocyte, blastomere or embryonic stem cell; and

(ii) identifying what RNAs are released from said nuclei after said contacting.

34. The method of Claim 33 wherein said identifying is effected by PCR.

35. A method for identifying RNAs that are involved in cell reprogramming comprising:

(1) adding the nucleus of a differentiated cell to an enucleated oocyte or cytoplasm thereof;

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(2) isolating RNAs therefrom; and

(3) effecting subtractive hybridization by subtracting said RNAs with RNAs obtained from said differentiated cell in order to identify mRNAs that are released by the cell nucleus as a result of reprogramming.

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